WHAT IS CLAIMED IS:

1. A method for manufacturing a semiconductor device, said method comprising the steps of:

forming a stopper film on a semiconductor substrate having a conductive layer formed therein;

forming an interlayer insulating film on said stopper film, said interlayer insulating film being made of a low dielectric constant material;

forming a capping film on said interlayer insulating film;

forming a resist film on said capping film, said resist film having a predetermined pattern;

etching said capping film and said interlayer insulating film using said resist film as a mask to form an opening reaching said stopper;

with said resist film left in place, etching the portion of said stopper film exposed at said opening to form a via hole; and

after said step of forming said via hole, removing said resist film through ashing.

2. The method as claimed in claim 1, further comprising steps of:

forming a barrier metal film on an inner surface of said via hole; and

forming a copper layer on said barrier metal film such that said copper layer fills said via hole.

3. The method as claimed in claim 1 or 2, wherein said ashing is carried out at a temperature of 200°C to 400°C using a mixed gas consisting of hydrogen and an inert gas.

4. The method as claimed in claim 3, wherein the volume percent of said hydrogen with respect to said inert gas is 1% to 40%.

5. The method as claimed in claim 4, wherein said inert gas is argon gas and the volume percent of said hydrogen with respect to said argon gas is 10% to 40%.

6. The method as claimed in claim 4, wherein said inert gas is helium gas and the volume percent of said hydrogen with respect to said helium gas is 1% to 30%.

7. The method as claimed in any one of claims 1 to 6, wherein said conductive layer is a copper wiring layer.

8. The method as claimed in any one of claims 1 to 7, wherein said interlayer insulating film is selected from a group consisting of a porous SiO_2 film, a porous SiOC film, and a porous SOG film.

9. The method as claimed in any one of claims 1 to 8, wherein said stopper film is selected from a group consisting of an SiC film, an Si_xN_y film, an SiCN film, and an SiOC film.

10. The method as claimed in any one of claims 1 to 9, wherein said capping film is an SiO_2 film or an Si_xN_y film.